EPA/ROD/R02-92/174
1992

EPA Superfund
Record of Decision:

KIN-BUC LANDFILL
EPA ID: NJD049860836
OU 02
EDISON TOWNSHIP, NJ
09/28/1992

RECORD OF DECISION DECISION SUMMARY

Kin-Buc Landfill

Edison Township, Middlesex County, New Jersey

United States Environmental Protection Agency
Region II
New York, New York

ROD FACT SHEET

SITE

Site name: Kin-Buc Landfill

Site location: Edison Township, Middlesex County, New Jersey

HRS score: 50.64

ROD

Selected remedy: Sediment Removal and Consolidation in On-Site Containment

Capital cost: $3,537,000

O & M cost: $67,100 (annual)

Present-worth cost: $4,314,900

LEAD

USEPA

Primary Contact: Alison Barry, (212) 264-8678

Secondary Contact: Janet Feldstein, (212) 264-0613

Main PRPs: Kin-Buc, Inc. (Transtech)
SCA Services (Waste Management NA)

WASTE

Waste type: PCBs

Waste origin: landfill leachate

Estimated waste quantity: 2200 cubic yards

Contaminated medium: wetlands sediment

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Kin-Buc Landfill

Edison Township, Middlesex County, New Jersey

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the Kin-Buc Landfill site, which was chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision document explains the factual and legal basis for selecting the remedy for this site.

The New Jersey Department of Environmental Protection and Energy concurs with the selected remedy. The information supporting this remedial action decision is contained in the administrative record for this site.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the KinBuc site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected response action represents the second of two planned operable units for the Kin-Buc site. A landfill containment system including a slurry wall, extension of the existing cap, and leachate collection and treatment will be implemented as part of the first operable unit, in accordance with the Record of Decision signed in 1988. This second action will address contamination found outside of the containment system, in particular, sediments contaminated by polychlorinated biphenyls (PCBs) in the Edmonds Creek wetlands located to the east of the landfill mounds. These sediments have been found to pose unacceptable threats to human health and the environment.

The major components of the selected remedy for the second operable unit include the following:

- excavation of approximately 2200 cubic yards of sediments containing PCBs at levels greater than 5 parts per million;

- consolidation of the excavated sediments within the Operable Unit 1 containment system;

- restoration of wetlands areas impacted by the excavation of contaminated sediments; and

- long-term monitoring of ground and surface water to ensure the effectiveness of the remedy.

The selected remedy will reduce ecological and human health risks caused by the uptake of PCBs from sediments into local aquatic species such as fish and crabs. However, because this remedy will involve on-site containment of contaminated sediments, long-term management and controls will be necessary.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate, and is cost-effective. It utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable for this site. However, treatment of the principal threats of the site was not found to be practicable, since the small volume of sediments which exceeded the remediation goal of 5 ppm could not be costeffectively treated. Therefore, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on the site within the first operable unit containment system, a review will be conducted within five years after commencement of the first operable unit remedial action to ensure that the selected remedies continue to provide adequate protection of human health and the environment.

TABLE OF CONTENTS

SITE NAME, LOCATION AND DESCRIPTION

The Kin-Buc Landfill, located at the end of Meadow Road, Edison Township, Middlesex County, consists of several inactive disposal areas which cover approximately 200 acres. The Kin-Buc site is located within an industrial and commercial area of Edison Township, Middlesex County, which is zoned for light industry. Figure 1 indicates the site location. The site is bordered on the south by the Edison Landfill, on the east by the wetlands and the inactive ILR Landfill, on the west by the Raritan River, and on the north by the Edison Salvage Yard and a chemical manufacturing plant. The Edgeboro Landfill is located across the river from the Kin-Buc and Edison landfills. The Heller Industrial Park, a light-industrial and commercial complex, is located approximately one-half mile to the northeast of Kin-Buc. Some residences are located approximately between one and a half and two miles to the north of the site. No drinking water supply wells, municipal or private, are located within a two-mile radius of the site. Upstream of the site, the City of New Brunswick withdraws water from the Lawrence Brook, a tributary of the Raritan River which enters the river from the west.

The site includes three landfill mounds, the 14-acre Low-Lying Area situated in between Kin-Buc I and the Edison Township Landfill, as well as the Edmonds Creek/Marsh area. Kin-Buc I is the largest of the landfill areas, covering 30 acres with a maximum elevation of 93 feet. Kin-Buc II, the smaller mound immediately north of Kin-Buc I, covers 12 acres at a maximum elevation of 51 feet. Mound B is located along the shoreline of the Raritan River to the west of Kin-Buc I, and consists of approximately nine acres at an average elevation of 15 feet. The 14-acre Low-Lying Area in between Kin-Buc I and the Edison Landfill has an elevation ranging between 10 and 25 feet, of which approximately 10 feet is fill material and refuse. The locations of these features are illustrated in Figure 2. Portions of the site, including the Edmonds Creek wetlands, the Pool C area, the eastern end of the Low-Lying Area, the mouth of Martins Creek, and the southern end of the Mound B area fall within the 100- or 500-year floodplain.

The Edmonds Creek wetlands consist of approximately 50 acres of tidal wetlands which border the landfill mounds on the east. The wetlands are drained by Edmonds Creek, which discharges to the Raritan River southeast of the Edison Landfill. A small channel connects Pool C, a tidal pool on the southeastern edge of Kin-Buck I into which oily leachate from Kin-Buck drains, to Edmonds Creek, and allows contaminants from the landfill to discharge into the creek and the surrounding wetlands. Because the marsh and Edmonds Creek are tidally influenced, with a maximum elevation of 4 feet above mean sea level, contaminants and sediments are regularly redistributed in response to tidal fluctuations and storm events. Edmonds Creek also receives drainage from the ditch between the Low-Lying Area and the Edison Landfill. On the northwestern side of Kin-Buck I and II, the Mill Brook/Martins Creek system flows past the site and discharges to the Raritan River at Mound B. This stream system receives runoff from the Kin-Buck mounds as well as upgradient sources, and is tidally influenced in the vicinity of Mound B.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Kin-Buck Landfill began operating as early as 1947, accepting municipal, industrial, and hazardous waste. Between 1971 and July 1976, KinBuck Inc. operated the site as a state-approved landfill for industrial (solid and liquid) and municipal wastes. Hazardous wastes were disposed in the main landfill mound, Kin-Buck I, as well as in Kin-Buck II. The Environmental Protection Agency (EPA) estimates, on the basic of owner-operator records, that approximately 70 million gallons of liquid waste and at least one million tons of solid waste were disposed of at Kin-Buck between 1973 and 1976. However, in 1976, the New Jersey Department of Environmental Protection and Energy (NJDEPE) revoked Kin-Buck's permit to operate because of violations of both state and federal environmental statutes.

EPA's involvement with the site began in 1976 during investigation of an oil spill at the site which revealed discharge of hazardous substances from the facility. EPA filed initial charges against the owner-operators in 1979, under such statutes as the Water Pollution Control Act, and the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA). Under a 1980 partial settlement, Kin-Buck Inc. (and not the other defendants) agreed to install a landfill cap and initiate a long-term monitoring program, but not to remediate the site or control the further migration of contaminants in the area. Therefore, in 1980, EPA began cleanup activities under Section 311(k) of the Clean Water Act, collecting aqueous and oily leachate from the Pool C area for treatment and disposal. In 1981, the site was placed on the Superfund National Priorities List.

When negotiations with the owner-operators for additional remediation failed, EPA issued a Unilateral Administrative Order (UAO) pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, as amended (CERCLA), requiring a removal program, a remedial investigation and feasibility study (RI/FS), implementation of a remedial action, and operation and maintenance of that selected remedy. Between 1982 and 1988, an RI/FS was conducted by the owner-operators for the site. This investigation determined that the Kin-Buck I and II landfill mounds were the source of hazardous constituents in the surrounding environment. In 1984, EPA also sent information request letters under CERCLA Section 104(e) to over 400 potentially responsible parties (PRPs) identified on the basis of Kin-Buck records as generators of wastes disposed of at Kin-Buck. Under a 1987 Consent Decree, EPA recovered $5,000,000 in past oversight and response costs from approximately half of these generators.

On the basis of the RI/FS conducted by the owner-operators, a remedy for the site was selected in a Record of Decision signed in 1988. The Record of Decision divided the site into two remedial phases known as operable units: Operable Unit 1 consists of the Kin-Buck I and II mounds, as well as portions of the Low-Lying Area and Pool C, while Operable Unit 2 includes adjacent areas impacted by contaminant migration from the landfill. The Operable Unit 1 selected remedy was intended to provide source control for the landfill mounds and includes:

- maintenance and upgrading of the Kin-Buck I cap, and installation of a RCRA Subtitle C cap on the remainder of the source area, consisting of Kin-Buck II, the Pool C area, and portions of the lowlying area between Kin-Buck I, the Edison Landfill and Pool C;

- installation of a circumferential slurry wall to bedrock on all sides of the source area;

- collection and off-site incineration of oily phase leachate;

- collection and on-site treatment of aqueous phase leachate and ground water from within the slurry wall, in order to ensure the integrity of the slurry wall containment system, with discharge of treated water to the Raritan River;

- periodic monitoring;

- operation and maintenance; and

- an additional RI/FS to determine the nature and extent of off-site contamination associated with the site (Operable Unit 2).

The owner-operators are currently performing the design of this remedy. EPA anticipates that construction of this remedy will begin during the summer of 1993.

The additional RI/FS was conducted by the owner-operators under amendments to the initial Unilateral Administrative Order issued in 1986 and 1990.

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The RI/FS report and the Proposed Plan for the second operable unit were released to the public for comment on July 15, 1992. These documents were made available to the public in the administrative record file at the Superfund Records Center at EPA's Region II office in New York City, and the information repository at the Edison Free Public Library, 340 Plainfield Avenue, Edison, New Jersey. The notice of availability for the above-referenced documents was published in the Home News on July 15, 1992. The public comment period on these documents was held from July 15, 1992 to August 14, 1992.

On August 4, 1992, EPA and the New Jersey Department of Environmental Protection and Energy conducted a public meeting at the Edison Township Municipal Building, to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the site, and to respond to any questions from area residents and other attendees.

Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (see Appendix V).

SCOPE AND ROLE OF OPERABLE UNIT

This is the second of two operable units planned for the Kin-Buck site. The Record of Decision issued in September 1988 for Operable Unit 1 selected source control measures intended to prevent the further migration of contaminants from Kin-Buck I and II landfill mounds, the Pool C area, and adjacent portions of the Low-Lying Area between Kin-Buck I and the Edison Landfill. The ROD also called for a second supplemental investigation of surface-water and ground-water contamination emanating from the site, as well as in the wetlands adjacent to the landfills, and Mound B. This investigation, Operable Unit 2, has focused on evaluating the nature and extent of

- ground-water contamination in the Low-Lying Area and Mound B,
- wetlands contamination in the Edmonds Creek/Marsh system, and
- surface-water contamination in Edmonds Creek and Mill Brook/Martins Creek.

The second operable unit remedy, as described in this document, is intended to address the contaminated sediments found in the Edmonds Creek marsh area. The primary goal of this remedy is to reduce the risks to human health and the environment caused by the uptake of contaminants from sediment into the aquatic food chain. The selected alternative for the second operable unit, in conjunction with the first operable unit containment system, will address all remaining concerns associated with the migration of contaminants from the landfill. Long-term monitoring of the ground water in the Operable Unit 2 study area, and of the Raritan River, will be conducted to confirm the expected performance of the Operable Unit 1 containment system.

EPA is the lead governmental agency for the Kin-Buck site, and NJDEPE is the support agency.

SUMMARY OF SITE CHARACTERISTICS

Wehran Engineering Corporation performed the second Remedial Investigation for the owner-operators between August 1989 and July 1990. The following section describes the results of the RI.

Environmental Setting

The Operable Unit 2 study area consists of Mound B, the Low-Lying Area, Edmonds Creek, Mill Brook/Martins Creek, and the wetlands associated with Edmonds Creek. Both Mound B and the Low-Lying Area are known to contain refuse; however, no additional information regarding the nature or origin of the refuse is available. Boring logs indicate that the primary components of the fill are municipal and household refuse and debris. Mound B received a cap in 1982, which consisted of clay and sand layers. The Mound B area includes a variety of dense grasses, as well as Phragmites communis and eastern red cedar, although portions of the Mound B cap are barren of vegetation. Cover soils were placed over the Low-Lying Area during the landfilling operation. The LowLying Area supports a scrub-shrub vegetative community, including sumac, eastern red cedar, and black cherry shrubs. The wetlands vegetative community is dominated by Phragmites communis, with Spartina alterniflora, commonly found along drainage channels and in areas of lower elevation. Narrow-leaved cattails (Typha angustifolia) dominate the less saline reaches of the marsh. Although no areas of the Operable Unit 2 study area support extensive forest communities, a variety of deciduous forest species are found in the Mill Brook/Martins Creek area, and along a former railroad bed which constitutes the upper bound of the Edmonds Creek marsh.

Wildlife identified at the site include invertebrates, fish, amphibians, reptiles, birds, and mammals. Fiddler crabs were the most abundant species of invertebrate, although blue crabs and grass shrimp were also observed. Mummichogs were the most frequently observed species of fish in Edmonds Creek and Martins Creek, although the type of sampling equipment used did not permit collection of larger species of fish from these streams. Turtles and terrapins were observed in Edmonds Creek and the Raritan River. Numerous bird species were observed at the site. A large community of muskrats is supported by the Edmonds Creek marsh area, and were also observed in MillBrook/Martins Creek. Smaller mammals in the Edmonds Creek marsh consist largely of the house mouse and the Norway rat. No federal endangered or threatened species were observed at Kin-Buck, although several New Jersey threatened and endangered species were observed either on the site or in the vicinity of Kin-Buck; these are the northern harrier, the osprey, the great and little blue herons, and the yellow-crowned night heron.

Geology and Hydrogeology

The Kin-Buck site is underlain by sedimentary rocks of Triassic Age, the Brunswick Formation and the Lockatong Formation. These formations consist chiefly of siltstone, mudstone and shale, and occur at depths ranging between 25 and 46 feet below the OU 2 study area. A sand-and-gravel unit, representing Recent Raritan River channel fill, overlies the bedrock locally at an average thickness of 16 feet. Within the Operable Unit 2 study area, a layer of organic-rich clay and silt known as "meadow mat" overlies the sand and-gravel deposit at an average thickness of 7 feet. A refuse layer of varying thickness (between 7 and 24 feet) overlies the meadow mat deposit throughout the OU 2 study area. The refuse contains relatively old waste materials, such as household and municipal solid waste, debris, white goods (household appliances), industrial wastes and fill materials. This layer is overlain by a thin (between 1 and 9 feet) layer of cover soil.

All four stratigraphic units are water-bearing, although only the bedrock unit is regionally extensive and used for water supply. In the refuse layer, ground water flows radially from the Kin-Buck I mound toward the Pool C area, the Edison Landfill, and the Raritan River, and is not tidally influenced by the river. The underlying meadow mat layer acts as a semi-confining layer; its fine-grained organic-rich matrix exhibits very low permeability, indicating that ground water does not readily flow in this unit either vertically or laterally. The sand-and-gravel unit is in direct hydraulic contact with the river, and is therefore affected by tidal influences. At low tide, ground water in this unit flows across the site from southeast to northwest. At high tide, this flow is reversed when ground water flows from Mound B toward the Low-Lying Area. However, net flow is west, towards the river. Ground water flows in the bedrock unit towards the south. However, in the Operable Unit 2 study area, where bedrock is directly overlain by the sand-and-gravel unit, bedrock flow is tidally influenced, causing a general oscillation of flow in the Mound B and Low-Lying areas. Vertical gradients within the four units indicate that net discharge from these units is to the Raritan River, either directly or indirectly. The refuse and sand-and-gravel units discharge directly into the Raritan River at high and low tides, respectively, while the bedrock unit discharges upward into the sand-and-gravel unit, from which ground water discharges to the river.

Contaminants were found in the refuse unit leachate, as well as in ground water from the sand-and-gravel unit and, at very low levels, in the bedrock aquifer. Leachate in the refuse unit contains volatile organic compounds (VOCs), base-neutral/acid extractable compounds (BNAs), metals and pesticides, and polychlorinated biphenyls (PCBs). Table 1 shows the maximum concentrations of contaminants in the leachate. These constituents appear to have originated within the Kin-Buck I and II mounds and have migrated toward Mound B and the Raritan River to the west, and towards the Edmonds Creek marsh on the east. The sand and gravel unit contains similar VOCs and BNAs as were found in the refuse unit, although at lower concentrations. Table 2 indicates the maximum levels of contaminants in this unit. These constituents also appear to have migrated from the landfill mounds. The bedrock unit contains very low levels of VOCs, as illustrated in Table 3, which may also be attributed to migrationfrom Kin-Buck 1.

Sediment

Sediments in the Edmonds Creek/Marsh system contain PCBs, polyaromatic hydrocarbons (PAHs) and metals. PCBs were found at concentrations less than 10 parts per million (ppm) in most parts of the marsh, although portions of the Edmonds Creek channel contained concentrations which ranged up to 81 ppm, and areas immediately adjacent to Pool C exhibited concentrations between 100 and 290 ppm. Table 4 indicates the range in concentrations observed during the investigation. PCBs identified were predominantly Arochlors 1248 and 1254. Distribution of these contaminants indicate that PCBs are attributable to Pool C via the connecting channel to Edmonds Creek. PAHs and metals were found throughout the marsh. Distribution patterns were less clear regarding PAHs and metals in the sediments; other man-made sources of PAHs and metals in the vicinity of the site have most likely contributed to the distribution of these constituents in the study area. However, certain metals and PAHs are highest in areas also characterized by high levels of PCBs. Figure 3 indicates the levels and distribution of PAHs in the Operable Unit 2 study area. Figures 4, 5, 6, and 7 illustrate the distribution of arsenic, copper, lead and nickel throughout the study area. Only one sample from Mill Brook contained PCBs, and the level observed was significantly below the detection limit. No site attributable patterns of metals of PAHs were observed in sediment samples from Mill Brook/Martins Creek.

Wehran also conducted a supplemental sediment sampling program which further refined the extent of PCB contamination in the Edmonds Creek wetlands sediment. The report confirmed the findings of the RI that low levels (less than 1 ppm and 10 ppm respectively) of PCBs and PAHs are present in the marsh. Metals were observed at higher levels in the vegetated areas of the Edmonds Creek marsh than in the stream channels which transect these wetlands, but distribution patterns are not related to Pool C or elevation within the marsh.

Surface waters in Edmonds Creek did not appear to be affected by site-derived contamination.

Biota

PCBs and metals were detected in resident wildlife collected in Edmonds Creek/Marsh, Mill Brook/Martins Creek, and the Reference Area (a similar area, located across the Raritan River from the site, which is intended to represent local background conditions). Tables 5 summarizes data from tissue analysis. The highest concentrations of PCBs were detected in fiddler crabs and small fish from the Edmonds Creek/Marsh area, while elevated levels of cadmium were observed in muskrat kidneys from the lower end of Edmonds Creek and Mill Brook/Martins Creek.

EPA conducted supplementary biological sampling in 1990 and 1991. In July 1990, EPA collected sediment and fiddler crab tissue samples from Edmonds Creek, Martins Creek, and an upstream reference location. The samples were analyzed for PCBs, semivolatile organics, and cadmium, chromium, copper, mercury and zinc. The results indicated that bioaccumulation of PCBs, chromium, copper and zinc was evident in the fiddler crabs. EPA also collected samples of muskrat tissues during the October 1990 through January 1991 period, but found no evidence of PCB bioaccumulation in muskrat livers. However, the study did show bioaccumulation of metals in these samples, although a specific source of metals contamination could not be ascertained, since distribution of metals throughout the OU 2 study area did not point to a single source. Tables 6 and 7 summarize the results of these studies.

SUMMARY OF SITE RISKS

EPA conducted a baseline risk assessment to evaluate the potential risks to human health and the environment associated with the Kin-Buc Landfill site in its current state. The Risk Assessment focused on contaminants in the sediment, ground water, surface water, and fish which are likely to pose significant risks to human health and the environment. The summary of the contaminants of concern (COC) in sampled media is listed in Table 8 for human health receptors. Tables 9, 10 and 11 provide a statistical summary of the data for all three media, including the frequency-of-detection, mean concentration, and the 95 percent Upper Confidence Limit (UCL).

Human Health Assessment

EPA's baseline risk assessment identified several potential exposure pathways by which the public may be exposed to contaminant releases at the site under current and future land-use conditions. Exposures to sediment, surface water, ground water, and fish were assessed for both potential present and future land use scenarios, such as residential and recreational land use. A total of eight exposure pathways were evaluated, using reasonable maximum exposure assumptions. The baseline risk assessment evaluated the health effects that could result from exposure to contamination as a result of ingestion of ground water, ingestion of fish, dermal contact with sediments during recreation, inhalation of chemicals volatilizing during showering, dermal exposure to shower water, dermal absorption and ingestion of surface water during recreation, and ingestion of sediment during recreation. These pathways were evaluated separately for children and adults. Certain pathways were eliminated on the basis of the existing landfill cap or existing site characteristics, such as the air pathways. It should also be noted that the site is not currently used for residential purposes and only for limited recreational use (i.e., fishing in the vicinity of the site). Current and past land use is primarily light-industrial and commercial. In addition, since there are no private or public drinking water wells located within the area of contaminated ground water or downgradient of the site, there is no existing mechanism for human exposure to the contaminated ground water. However, for the purposes of evaluating all possible risks associated with the site, EPA considered potential future residential scenarios involving ground-water consumption and current recreational exposure scenarios such as fishing and swimming.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and noncarcinogenic effects due to exposure to site chemicals are considered separately. It was assumed that the toxic effects of the siterelated chemicals would be additive. Thus, carcinogenic and noncarcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and noncarcinogens, respectively.

Noncarcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligrams per kilogram per day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds within a particular medium that impact a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for noncarcinogenic health effects to occur as a result of site-related exposures. TheHI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media. The reference doses for the compounds of concern at the site are presented in Table 12. A summary of the noncarcinogenic risks associated with these chemicals for individual exposure pathways is found in Table 13.

It can be seen from Table 13 that the HIs for noncarcinogenic effects from ingestion of fish (reasonable maximum exposures) are 20 and 7.19, for children and adults, respectively. For ingestion of ground water, the His for noncarcinogenic effects are 6.13 and 5.42, respectively. Therefore, noncarcinogenic effects may occur from these pathways evaluated in the Risk Assessment. The noncarcinogenic risk was attributable to several compounds including PCBs, vinyl chloride, chlorobenzene, arsenic, antimony, beryllium, bis(2-ethylhexyl)phthalate, 4,4'-DDT, and manganese.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of (mg/kg-day)[-1], are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SF. Use of this approach makes the underestimation of the risk highly unlikely. The SF for the compounds of concern are presented in Table 12.

For known or suspected carcinogens, EPA considers excess upperbound individual lifetime cancer risks of between 10[-4] to 10[-6] to be acceptable. This level indicates that an individual has not greater than approximately a one in ten thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at a site. The potential cancer risk from ingestion of fish from the site during a lifetime is 1.31 x 10[-1] for an adult and 1.1 x 10[-1] for a child. The potential carcinogenic risk for ingestion of the most contaminated ground water at the site by an adult during a 70-year lifespan is 6.6 x 10[-4], and by a child, 2.3 x 10[-4]. These risk numbers can be interpreted to mean that 1.31 out of ten adults are at an excess risk of developing cancers because of their regular consumption of contaminated fish during their lifetime, or that 6.6 people out of ten thousand are at an excess risk of developing cancer because of their regular consumption of ground water from the site during their lifetime. These risks exceed the acceptable risk range for carcinogens of 10[-4] to 10[-6]. A summary of cancer risks associated with the chemicals of concern for various exposure pathways appears in Table 13.

The estimated total risks for both carcinogens and noncarcinogens are primarily due to the ingestion of contaminated fish from the site and secondarily to the ingestion of contaminated ground water by potential future residents at the site. These estimates were developed by taking into account various conservative assumptions about the likelihood of a person being exposed to these media. However, in reviewing both the baseline risk assessment and the site conditions, EPA concluded that the location and characteristics of Kin-Buc preclude any current exposure to contaminated ground water at the site. Furthermore, EPA believes that it is highly unlikely that humans will ever use the ground water underlying this site, given the historical and current land use in this area of Edison Township. The proximity of the Edison Landfill immediately to the south of Kin-Buc and the defunct ILR Landfill on the eastern side of the Edmonds Creek wetlands limit the future development of this area for residential purposes. In addition, ground-water modeling conducted during the FS indicates that natural attenuation will gradually reduce contaminants to acceptable levels after the source control measures provided by Operable Unit 1 are implemented. Since it is highly unlikely that any exposure pathways will exist in the foreseeable future, EPA does not believe that there are any actual or plausible potential site risks associated with ground water which would justify active response measures to reduce contaminant concentrations in ground water.

In summary, ingestion of fish from the site constitutes a risk to human health, since both carcinogenic and noncarcinogenic risks exceed the acceptable levels. Other plausible exposure pathways present risks that are within or below EPA's allowable range.

Ecological Risk Assessment

Potential risks to the environmental receptors associated with the Kin-Buc Landfill site were identified in the ecological risk assessment. The ecological risk assessment identified fish found in Edmonds Creek and the Raritan River and benthic invertebrates such as fiddler crabs found in the Edmonds Creek marsh as those receptors most threatened by the site contaminants under current site conditions. The major site-related risks to aquatic life are posed by PCBs in sediments in the area adjacent to Pool C and Edmonds Creek, since fish and crabs come into direct contact with sediments or may ingest other species which have accumulated contaminants through the food chain.

EPA, through its contractor, evaluated the potential ecological impacts to fish, wildlife and plants in the wetlands from chemicals of concern detected in sediments and surface waters. These chemicals include a variety of VOCs, PAHs, PCBs, pesticides and metals. Potentially affected biota include fiddler crabs, mummichogs (small fish), large birds such as herons and hawks which feed on smaller fish and mammals, muskrats and other small mammals (mice, Norway rats) found in such environments. The ecological risk assessment included an evaluation of sediment samples from the Operable Unit 2 study area. Tissue samples from key species captured in corresponding locations were collected in order to determine the extent of bioaccumulation relative to contaminant levels in sediment. The ecological risk assessment concluded that the major site-related risk to aquatic life is from exposure to PCBs in sediments in the vicinity of Pool C and the connecting channel, and portions of Edmonds Creek. Organics in surface waters do not appear to pose a threat to aquatic life at the site. Although several metals were elevated in species and sediments, those levels appear to reflect regional inputs and/or natural sources. Metals are present in levels of concern in the vicinity of Pool C and portions of Edmonds Creek, although distribution patterns do not indicate that Kin-Buc is the sole, or even primary source of metals contamination. Mammals do not appear to be at risk from PCBs or metals, although elevated levels of cadmium, chromium and lead were observed in muskrat tissues. Marsh plants may also be at risk from exposure to arsenic, copper and lead, but uncertainties associated with plant toxicity information preclude establishing risks in this case.

Sediments contaminated by PCBs and metals can serve as a source of PCB and metals contamination in fish and benthic invertebrates. The literature data indicate that levels present in Edmonds Creek fish samples may pose adverse effects in these species, although the effects of elevated bodyburden levels in fiddler crabs are unknown. Both fish and fiddler crabs can be a food source to large birds such as the great blue heron. Estimated dosages did not exceed the toxicity reference values for this species, but a high level of uncertainty is associated with these estimates and the possibility of adverse effects cannot be dismissed for this or other predatory bird species occurring in the site area. Threatened and endangered species, such as the great blue heron, the little blue heron, the yellow-crowned night heron, the northern harrier, and the osprey, have been observed on or near the Kin-Buc site during the RI.

EPA has determined that no remediation will be required for surface or ground water in the study area, based on the available data and the unlikely possibility that the ground water will be used for human consumption. However, exposure pathways involving the ingestion of contaminated fish will continue to pose a threat to human health without active remediation of the contaminated sediments which act as the source of contaminants to fish and fiddler crabs. In addition, the ecological risk assessment indicates that contaminants are being taken up into the food chain via various aquatic species which come into contact with the sediments. Bioaccumulation of PCBs through this pathway may adversely impact these species as well as species which feed on them, including threatened and endangered birds.

Therefore, actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present a current or potential threat to public health, welfare or the environment.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is significant uncertainty as to the actual levels present. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the chemicals of concern, the period of time over which such exposure would occur, and the models used to estimate the concentrations of the chemicals of concern at the point of exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the Risk Assessment provides upper-bound estimates of the risks to populations near the site, and is highly unlikely to underestimate actual risks related to the site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the Risk Assessment Report.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment; they specify the contaminant(s) of concern, the exposure route(s), receptor(s), and acceptable contaminant level(s) for each exposure route. These objectives are based on available information and standards such as applicable or relevant and appropriate requirements (ARARs) and risk -based levels established in the risk assessment.

EPA has developed remedial action objectives for the wetlands sediments which are intended to reduce risks to human health via ingestion of contaminated fish and to the environment via bioaccumulation of contaminants in aquatic species. Although the general remedial objectives for this site include reduction of risks associated with metals and PAHs in the wetlands sediments, EPA chose to develop numerical cleanup goals only for PCBs. PCBs are clearly site-derived, whereas PAHs and metals may be derived from other sources in the area. In addition, the levels of cadmium, chromium and lead measured aquatic and terrestrial species did not appear to constitute significant risks to these species. PAHs were not observed in any species sampled. Finally, areas subject to remediation for PCB contamination also contain high levels of PAHs and metals, such that a PCB-driven remedial action will effect reduction of these other contaminants.

EPA's remediation goal for PCBs in wetlands sediment is 5 ppm. This goal reflects several different contributing factors: EPA's evaluation of bioavailability, based on application of the Interim Equilibrium Partitioning Method developed by the Office of Water; biological effects data from literature studies; and remediation goals for PCBs in sediment at other Superfund sites. EPA also considered competing factors such as the technical feasibility of full remediation and the desire to minimize, as much as possible, the impact of invasive remediation techniques on the existing wetlands, which currently support a variety of plant and animal species. Application of the 5 ppm cleanup goal to the sediments in the Edmonds Creek marsh provides for removal of PCBs that exceed the level EPA has determined to be adequately protective of resident wildlife. Removal of these sediments also reduces risks associated with the PAHs and metals which accompany PCBs in the connecting channel and the vicinity of Pool C, portions of Edmonds Creek, and the northern area of the marsh. The total volume of sediments to be excavated is approximately 2200 cubic yards, and involves approximately 1.36 acres of the Edmonds Creek wetlands. This area is shown in Figure 8.

As discussed above, under the Summary of Site Risks, EPA did not develop remedial action objectives for ground water or surface water. The implementation of source control provided for in the Operable Unit 1 remedial action will be sufficient to prevent further migration of contaminants into the environment. Contaminants which have already migrated into the ground water will be gradually reduced by natural attenuation to acceptable levels. Although significant impacts to the Raritan River are not suggested by current data, the future migration of contaminants from Kin -Buc will decrease following construction of the OU 1 containment system. In addition, EPA has determined that there are no current or plausible future exposure scenarios which could pose a risk to human health.

DESCRIPTION OF REMEDIAL ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost-effective, comply with other statutory laws, and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The information presented in the RI and Risk Assessment was used to prepare a Feasibility Study. The FS provides a detailed evaluation of various options, referred to as remedial alternatives, which address the environmental problems identified at the site. Detailed descriptions of these remedial alternatives may be found in the Draft Final FS Report available in the administrative record file. The following alternatives passed through a development and screening process which is also described in the FS Report.

This Record of Decision evaluates in detail, six remedial alternatives for addressing the contamination associated with the Kin-Buc Landfill site. The time to implement reflects only the time required to construct or implement the remedy, as well as the time required to design the remedy and procure contracts for design and construction.

The numbers in parentheses correspond to the numbering used in the FS Report to identify each alternative or subalternative.

Alternative 1--No Further Action

Capital Cost: $0
Annual Operation and Maintenance (O & M) Cost: $61,000/yr
Present Worth Cost: $938,900 (on a 30-year basis)
Time to Implement: between 7 and 82 years

The Superfund program requires that the No Action alternative be considered as a baseline for comparison of other alternatives. Under this alternative, no remedial activities would be conducted in any portion of the Edmonds Creek Marsh OU 2 study area. The source of contamination to the Edmonds Creek Marsh would be contained by implementation of the OU 1 remedy which includes a slurry wall, cap, and extraction and treatment of leachate and ground water within the slurry wall. Under this alternative, the 5 ppm remediation goal would be achieved, to the extent possible, through natural sediment burial and diffusive partitioning into the water column. A sediment dynamics model for estimating vertical sediment burial rates was applied to provide a rough estimate of the timeframe during which natural recovery of the wetlands would be expected to occur. The model was applied using the overall average PCB concentration in the wetlands (7.1 ppm), the average concentration exceeding the 5 ppm goal in the wetlands (77 ppm) and the maximum concentration (300 ppm) outside the OU 1 slurry wall. The model indicated that a concentration of 5 ppm would be achieved within 7 years, 55 years and 82 years, respectively. A sediment sampling program would be undertaken every 6 months to determine the rate at which burial of PCBs is taking place. This data would be reviewed periodically to evaluate changes in PCB concentrations over time. A 30-year monitoring program was used for costing purposes. There are no federal or state ARARs associated with this alternative, since the no action alternative does not involve any remedial activity in existing wetlands. Given the level of uncertainty in the model's results, the actual time required to reach compliance with the preliminary remediation goal of 5 ppm may exceed the estimated timeframe. To confirm the effectiveness of the OU 1 containment system, a ground water and surface water monitoring program will also be implemented. Present worth costs associated with this alternative include the monitoring program estimated over 30 years.

Alternative 2A (3A)--Sediment Removal and Consolidation in On-Site Containment

Capital Cost--$3,537,000
Annual O&M Cost--$67,100
Present Worth Cost--$4,314,900
Time to Implement--3 years

Under this alternative, soils and benthic sediments containing PCBs in excess of 5 ppm in the Edmonds Creek marsh, creek, and areas adjacent to Pool C would be removed, dewatered and placed within the OU 1 on-site containment system. The total volume of sediment, as indicated in Figure 9, is estimated to be approximately 2200 cubic yards, based on the total estimated area which exceeds the cleanup goal (approximately 1.36 acres) and an excavation depth of one foot. Containment of excavated sediment would be provided within the OU 1 containment system. Supernatant from dewatering would be disposed of off site in compliance with the requirements of the Toxic Substances Control Act (TSCA) governing PCB disposal. Prior to excavation, additional surface sampling for PCBs would be conducted in areas previously identified as exceeding 5 ppm PCBs,as well as in the area east of Pool C, in order to refine the actual areas for excavation. Sampling would also be conducted at depth in selected locations to confirm the vertical extent of contamination. Engineering methods for controlling surface water flow, such as tide gates or temporary earthen dams, and to reduce impact to wetlands, such as hydraulic dredging or dragline dredging, would be utilized during excavation. Excavated areas would be restored by active revegetation with any of several marsh species. This alternative would meet ARARs requiring mitigation or restoration of disturbed wetlands, as well as chemical-specific ARARs associated with PCBs (TSCA), and meet the site-specific remediation goal of 5 ppm PCBs. RCRA Land Disposal Restrictions are not applicable to consolidation within the Area of Contamination (AOC), so testing for RCRA characteristics would not be required. Additional studies of surface water and biota will be necessary to design a restoration/mitigation program for the Edmonds Creek Marsh. Present worth and O&M costs for this alternative also include a ground-water and surface-water monitoring program, estimated over 30 years.

Alternative 2B (3B)--Sediment Removal and Off-Site Disposal

Capital Cost--$5,168,000
Annual O&M Cost--$67,100
Present Value Cost--$5,945,900
Time to Implement--3 years

This alternative is the same as Alternative 2A, Sediment Removal and Consolidation On-Site, except that the excavated sediments would be land disposed off site in a chemical waste facility in accordance with TSCA requirements governing disposal of PCB-contaminated soils. Prior to disposal, the sediments would be dewatered. The supernatant would be disposed of off site in a TSCA facility. Sediments would be tested to determine characteristicity for metals prior to disposal, so that compliance with RCRA Land Disposal Restrictions is ensured. Present worth and O&M costs include a ground water and surface water monitoring program, estimated over 30 years.

Alternative 2C (3C)--Sediment Removal and On-Site Treatment

Capital Cost--$6,225,000
Annual O&M Cost--$67,100
Present Worth Cost--$7,002,900
Time to Implement--4 years

This alternative is the same as Alternative 2A except that the excavated sediments would be treated on site to reduce PCB concentrations to below 5 ppm, using one of the following processes: solvent extraction, thermal extraction, or chemical dechlorination. Excavated sediments would be tested to determine whether they are RCRA characteristic due to metals content during predesign. A stabilization/solidification stage would be added prior to disposal in accordance with RCRA Land Disposal Restrictions if the sediments are characteristic wastes. Depending on costs, disposal would be either on site in an OU 2 containment system, or off site in a commercial disposal facility. A pilot-scale treatability study would be necessary in order to design a full-scale treatment train. Use of an on-site treatment system would require additional site preparation to accommodate the trailer and other equipment. Although no consolidation will be required prior to treatment, the system would have to meet ARARs for air pollution controls or TSCA requirements for disposal of a residual waste stream from the thermal and solvent extraction processes. This alternative involves higher costs per unit of sediment because of the treatability study and mobilization/demobilization costs associated with treatment equipment. Additional ARARs, as described in Table 12, involve requirements for wetlands mitigation/restoration. Present worth and O&M costs also include a ground-water and surface-water monitoring program, estimated over 30 years.

Alternative 3 (4)--Sediment Capping with Stream Relocation
Capital Costs--$4,956,000
Annual O&M Costs--$114,100 (year 1)
$104,100 (year 2)
$ 96,100 (years 3-5)
$ 49,100 (years 6-10)
$ 46,100 (years 11-30)
Present Worth Cost--$5,907,900
Time to Implement--4 years

This alternative would involve in-situ capping of sediments which exceed the 5 ppm cleanup level for PCBs, either with clean sediments or a single layer synthetic membrane cap. Portions of streams containing or immediately adjacent to contaminated sediments would be re-routed through a new channel dug parallel to the old channel in uncontaminated sediments. Excavated clean sediments would be used to fill in the former stream channel, burying the contaminated sediment. Any remaining exposed sediments which exceed 5 ppm and those adjacent to Pool C would be covered by a single layer synthetic membrane cap. A sampling program to further refine the actual areas for removal and identify the new stream channel would be necessary. This alternative would also require a hydrologic study of Edmonds Creek/Marsh in order to design the new stream system. Vegetation control would be required to prevent regrowth of marsh plants through the capped portions. The cap and protective berms would displace approximately 5.9 acres of wetlands, and there would be long-term impacts to the remaining wetlands associated with maintenance of the containment system.

Mitigation of wetlands would be required. Engineering methods to reduce impacts to the wetlands during construction would be utilized. RCRA Land Disposal Restrictions are not applicable to consolidation within the Area of Contamination, so metals testing for characteristicity will not be required. Higher O&M costs reflect the maintenance costs associated with capping, as well as higher wetlands mitigation costs. Present worth and O&M costs include a groundwater and surface-water monitoring program, estimated over 30 years.

Alternative 4 (5)--Sediment Containment in Vicinity of Pool C by Capping and Slurry Wall to Meadow Mat, Remaining Sediment Consolidation, Limited Stream Relocation

Capital Costs--$4,706,000
Annual O&M Costs--$110,100 (year 1)
$103,100 (year 2)
$ 96,100 (years 3-5)
$ 50,100 (years 6-10)
$ 49,100 (years 11-30)
Present Worth Cost--$5,686,900
Time to Implement--3 years

This alternative would require excavation of soils and benthic sediments exceeding the 5 ppm cleanup level. These sediments would be dewatered and placed within an on-site containment unit constructed in the vicinity of Pool C, which is the most highly contaminated area of OU 2. This area would be encompassed by a slurry wall to the meadow mat layer, extending out from the OU 1 slurry wall. The resulting contained area would be separate from OU 1 but located on the perimeter, and would receive a single-layer synthetic membrane cap similar to the OU 1 cap. Construction of this containment unit would require relocation of a portion of Edmonds Creek. The area subject to removal is approximately 0.94 acres, although sampling would be done during the predesign phase to refine the extent of excavation and after excavation to confirm compliance with the cleanup level. This alternative would require a hydrologic study of Edmonds Creek in order to determine the effects of the tidal cycle on the remedial action. The alternative may also involve compatibility testing to determine the composition of the slurry/backfill mixture used for the wall, and a subsurface boring program to obtain the geologic information necessary to the design. A wetlands mitigation program would be required to compensate for the wetlands area lost. Liquid from dewatering would be sent to an off-site disposal facility in accordance with TSCA requirements. RCRA Land Disposal Restrictions are not applicable to consolidation within the AOC. Higher costs reflect higher maintenance costs associated with capping and the slurry wall, as well as wetlands mitigation. Present worth and O&M costs reflect a ground water and surface water monitoring program, estimated over 30 years.

Because Alternatives 1, 2A, 3, 4 and possibly 2C would result in contaminants remaining on the site, CERCLA requires that the site be reviewed every five years. The five-year review for Alternative 2A would be accomplished by the five-year review also required for the Operable Unit 1 remedy. If justified by the review, additional remedial actions may be implemented to remove or treat the wastes.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

During the detailed evaluation of remedial alternatives, each alternative was assessed utilizing nine evaluation criteria as set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01. These criteria were developed to address the requirements of Section 121 of CERCLA to ensure all important considerations are factored into remedy selection decisions.

The following "threshold" criteria are the most important, and must be satisfied by any alternative in order to be eligible for selection:

1. Overall protection of human health and the environment addresses whether or not a remedy provides adequate protection and describes how risks posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy would meet all of the applicable, or relevant and appropriate requirements of federal and state environmental statutes and requirements or provide grounds for invoking a waiver.

The following "primary balancing" criteria are used to make comparisons and to identify the major trade-offs between alternatives:

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

4. Reduction of toxicity, mobility, or volume through treatment is the anticipated performance of a remedial technology, with respect to these parameters, that a remedy may employ.

5. Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation periods until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of materials and services needed.

7. Cost includes estimated capital and operation and maintenance costs, and the present-worth costs.

The following "modifying" criteria are considered fully after the formal public comment period on the Proposed Plan is complete:

8. State acceptance indicates whether, based on its review of the RI/FS and the Proposed Plan, the State supports, opposes, and/or has identified any reservations with the preferred alternative.

9. Community acceptance refers to the public's general response to the alternatives described in the Proposed Plan and the RI/FS reports. Factors of community acceptance to be discussed include support, reservation, and opposition by the community.

A comparative analysis of the remedial alternatives based upon the evaluation criteria noted above follows.

. Overall Protection of Human Health and the Environment

With the exception of the No Further Action alternative, all of the alternatives will prevent the further migration of contaminated sediments, reducing human health risks associated with ingestion of contaminated fish and environmental risks associated with uptake of PCBs and other contaminants from sediment into the aquatic and terrestrial food chains. Therefore, all of these alternatives except the no action alternative will provide adequate protection of human health and the environment through containment of contaminated sediments or a combination of treatment and containment. All active response actions will impact the wetlands and Edmonds Creek during construction. Alternatives 3 and 4 will involve permanent ecological impacts in the Edmonds Creek marsh, since they include in-situ containment and stream relocation.

Modeling of sediment burial rates indicates that maximum PCB concentrations could take as long as 82 years to decline through burial to the 5 ppm cleanup goal. Since EPA's ecological and human health assessments have indicated that the contaminated sediments currently pose a risk to human health and the environment, the no action alternative will not provide sufficient protection within a reasonable timeframe.

. Compliance with ARARs

The applicable or relevant and appropriate requirements for the Operable Unit 2 remedial action are listed in Table 14. Portions of the study area lie within the 100- and 500-year floodplains, and the remedial objectives for this site require response action within the Edmonds Creek wetlands area. Therefore, a variety of state and federal wetlands and floodplain regulations will be ARARs for the remedial action at the Kin-Buc site.

Although EPA has established a cleanup goal of 5 ppm for PCBs in the sediments, there are no chemical-specific ARARs for sediments in the Edmonds Creek/Marsh area. All of the alternatives will comply with the action/location-specific ARARs for remedial activities in wetlands and floodplains, although certain alternatives require compliance with a greater number of ARARs. Alternatives 2B and 2C involve off-site disposal and on-site treatment and disposal, respectively. Both of these actions constitute "placement" (removing the waste from the area of contamination prior to land disposal) of a potential RCRA characteristic waste. Sediments for these alternatives must be tested to determine whether they are characteristic RCRA wastes prior to any disposal; if they are characteristic because of their metals content, additional treatment (solidification/stabilization) will be required prior to disposal. All treatment residues must be disposed of in accordance with either TSCA or RCRA depending on their constituents. All alternatives involving dewatering of sediment must also comply with TSCA requirements for disposal of the supernatant. Alternatives 3 and 4 call for in-situ containment and stream relocation. Since these alternatives will involve greater displacement and have permanent ecological impacts compared to Alternatives 2A, 2B or 2C, a greater degree of mitigation/restoration will be required to satisfy both state and federal ARARs.

. Long-Term Effectiveness and Permanence

Alternative 1, No Further Action, does not provide for long-term protection of human health and the environment, since it will not prohibit the migration of contaminants into the aquatic and terrestrial food chains for a significant period of time, nor can the effectiveness of natural sedimentation rates be evaluated with a high degree of confidence. Alternative 2A provides adequate protection by removing the source of contaminants, the sediments, from direct contact with the wetlands and placing them within the OU 1 containment system, which is equivalent in specifications to a chemical waste landfill. Alternative 2B is similar in that it provides for containment of the source materials, but removes the excavated sediments from the site completely, to a commercial chemical waste land disposal facility. Alternative 2C provides the greatest degree of permanence by requiring treatment of the sediments to remove or destroy the contaminants. In-situ containment in the wetlands, such as described in Alternatives 3 and 4, may be the least effective over the long term because of the technical difficulty of constructing and maintaining containment in this environment. In addition, unlike Alternatives 2A, 2B, and 2C, contaminants will remain in the wetlands. Maintenance of containment structures--cap, slurry wall--will have long-term effects on the hydrology of the wetlands as well as on the plant and animal species which inhabit the wetlands. Construction of Alternative 3 is expected to result in a greater loss of wetlands acreage (5.9 acres) than Alternatives 2A, B, and C (1.36 acres), or 4 (2.67 acres). All alternatives, except Alternatives 2B and 2C, will result in contaminants remaining on-site and will be subject to a regular five-year review. However, containment in the OU 1 landfill will be more protective and provide more long-term effectiveness than either containment in a much smaller unit constructed (in the area adjacent to Pool C) or in-situ containment in the wetlands, since OU 1 includes a slurry wall constructed to bedrock as well as leachate and ground water control. All alternatives except No Action will provide reduction in risks associated with the sediments, but only Alternative 2C will not require long-term monitoring or maintenance.

. Reduction in Toxicity, Mobility, or Volume

Only Alternative 2C addresses the principal threats (PCB contaminated sediment containing more than 5 ppm PCBs) by treatment. All available treatment technologies for PCBs can be expected to meet the remediation objective of 5 ppm PCBs through either removal of PCBs via solvent extraction, or thermal destruction of organics. Treatment would therefore effect a reduction in toxicity, mobility and volume of contaminants. None of the other alternatives involve treatment of the principal threats. Although dewatering may remove some percentage of the total mass of PCBs in the sediment, this process is not expected to result in significant reduction since PCBs adsorb to sediments. Residuals will remain after either thermal treatment or solvent extraction; these will be disposed of off-site in a chemical waste facility.

. Short-Term Effectiveness

Short-term effectiveness denotes the length of time it takes for the remedy to become effective, as well as the adverse impacts that implementation of the remedy may have on human health or the environment. The No Further Action alternative is not considered effective in the short-term, since it would allow continued migration of contaminants in the wetlands, and provides no immediate protection of human health or the environment. Alternatives 2A, and 2B could be completed within approximately three years, compared to a longer implementation time for Alternatives 2C (four years), 3 and 4 (at least four years). Therefore, Alternatives 2A, 2B, and 2C would involve fewer shortterm impacts to the wetlands during construction. Alternatives 3 and 4 also involve construction of a permanent containment system in the wetlands, as well as permanent relocation of the Edmonds Creek stream channel. This construction would result in more short-term impacts to the wetlands than construction of Alternatives 2A, 2B, and 2C, due to lengthier implementation times and the more complex and invasive nature of the remedies. Construction of Alternative 3 is expected to result in a greater loss of wetlands acreage (5.9 acres) than Alternatives 2A, B, and C (1.36 acres). Construction of Alternative 4 would result in impacts to 2.67 acres of wetlands, although only .94 acres represent excavated sediment. These features would result in both short-and long-term adverse impacts to resident wildlife, including mammals and aquatic species, in the wetlands. All alternatives would involve adverse impacts to the wetlands, either through containment of contaminated sediment or excavation of sediment which exceeds the remedial objective of 5 ppm PCBs. Mitigation of these impacts will be required, either in the form of active restoration (revegetation by marsh plants) of disturbed areas, or replacement of areas which will be permanently disrupted. Use of temporary surface water controls and specialized excavation methods and equipment can reduce the amount of sediment remobilized during excavation as well as impacts to the wetlands.

Minimal health risks to workers are anticipated for implementation of Alternatives 2A, B and C. Removal of sediment may result in a potential exposure pathway for on-site workers, although use of protective equipment can mitigate health risks to these workers. Off-site disposal presents some degree of risk to workers and off-site communities relative to on-site disposal, since it involves transportation of potentially hazardous materials. Onsite treatment will transfer contaminants to additional media (air, liquid), requiring additional controls to reduce exposures of on-site workers and to prevent migration off site of these residuals.

. Implementability

All of the alternatives are considered implementable. Alternative 1, No Further Action, is the easiest to implement since it requires only periodic monitoring to evaluate natural recovery. All alternatives depend on additional hydrologic and biota studies to minimize impacts due to construction and maximize restoration of the wetlands. On-site disposal of sediments in OU 1 depends on the design and construction schedule for the OU 1 remedial action; placement of the excavated sediment within OU 1 must be coordinated to avoid delays in implementation of the OU 1 remedy. Off-site disposal depends on the availability of a disposal facility and on the results of hazardous classification testing, since the sediments will have to be solidified prior to disposal if they are characteristic wastes. Treatment of wastes on the site is technically implementable, but the small volume of sediments to be treated (2200 cubic yards) may not warrant performance of a pilot-scale treatability study and mobilization of equipment designed for much larger volumes of soil. In addition, the treated wastes will have be tested to determine if they are RCRA characteristic based on metals content. If they are characteristic, the sediments will have to be solidified prior to any land disposal since treatment will only be effective for PCBs and other organic compounds. Alternatives 3 and 4 require long-term maintenance and operation of the containment systems, which include control of vegetation and surface water flow, as well as maintenance of a cap and/or slurry wall in a wetlands environment.

. Cost

A summary of cost estimates for all alternatives evaluated appears in Table 15.

The No Further Action alternative is the least costly, with a present worth cost of $938,900 which includes long-term ground water and surface water monitoring. The present worth costs of Alternatives 2A, 2B, and 2C are, respectively, $4,314,900, $5,945,900, and $7,002,900. Present worth costs for Alternatives 3 and 4 are $5,907,900, and $5,686,9000, respectively.

It should be noted that the O&M costs for Alternatives 3 and 4, estimated over thirty years, far exceed those associated with Alternatives 2A, 2B and 2C: $189,000 for Alternative 3 and $188,000 for Alternative 4, as compared to $23,000 for each of the previous alternatives. These O&M costs reflect relatively high maintenance costs for containment structures such as caps and slurry walls, including control of vegetation and burrowing animals, over an indefinite period of time. The most expensive remedy is Alternative 2C, because of the high unit cost associated with on-site treatment of the sediments. On-site sediment treatment is not usually implemented for volumes of waste smaller than 10,000 to 15,000 cubic yards because of the costs associated with equipment mobilization/demobilization and performance of treatability studies. The high cost of Alternative 2B derives from the high unit costs associated with land disposal in a commercial chemical waste facility. Alternative 2A, which provides for on-site disposal of the sediment in OU 1, is the second least expensive option, since it uses the containment system currently in design as part of the OU 1 response action. All estimated costs include a long-term surface-water and groundwater monitoring program.

. State Acceptance

The State of New Jersey concurs with EPA's preferred alternative, 2A.

. Community Acceptance

In general, both officials and community residents expressed support for Alternative 2A. A more detailed discussion of community concerns is presented in the Responsiveness Summary.

SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed analysis of the alternatives, and public comments, both the New Jersey Department of Environmental Protection and Energy and EPA have determined that Alternative 2A is the most appropriate remedy for Operable Unit 2 of the Kin-Buc site.

The major components of the selected remedy are as follows:

. Excavation of approximately 2200 cubic yards of sediments with PCB levels that exceed the remedial action objective of 5 ppm total PCBs;

. Disposal and containment of the excavated sediment within the OU 1 slurry wall and cap;

. Active restoration of the approximately 1.36 acres of excavated wetlands, according to a restoration program which will be developed during the design phase, in the Edmonds Creek Marsh, as well as mitigation of impacts caused by remedial activities;

. Long-term monitoring of ground water underlying Mound B and the Low-Lying Area, surface water in Edmonds Creek, and the Raritan River adjacent to Mound B; and

. Maintenance of the Mound B cover.

By excavating contaminated sediments, the preferred alternative will prevent the further bioaccumulation of PCBs and metals in aquatic and terrestrial species residing in the Edmonds Creek Marsh, thereby reducing ecological and human health risks associated with the Kin-Buc Landfill. Disposal of the excavated sediment in the OU 1 containment system will provide long-term protection of human health and the environment. Although this alternative does not satisfy the statutory preference for treatment, EPA concluded that the costs and implementability of available treatment technologies did not justify selection of Alternative 2C, given the small volume of sediment with relatively low concentrations of PCBs. Alternative 2B did not provide more protectiveness than 2A, despite considerably greater costs. The preferred alternative will have fewer short-term impacts to wetlands in comparison to Alternatives 3 and 4, which involve stream relocation and some degree of in-situ containment in the marsh, thereby reducing the subsequent mitigation requirements. Alternative 3 would involve disturbance of a significantly greater area of thewetlands compared to Alternatives 4, 2A, 2B, or 2C. Few long-term adverse impacts on plants or wildlife are anticipated with 2A, 2B, or 2C, since the remedial action will not involve any permanent changes in the wetlands environment, unlike Alternatives 3 and 4. With respect to cost, Alternative 2A is the least costly of the active response measures. With respect to compliance with ARARs, Alternative 2A is expected to satisfy all of the action- and location-specific ARARs described in the FS. A wetlands restoration/mitigation program will be developed during the design phase and implemented after excavation of the contaminated sediments. No RCRA Land Disposal Restrictions are potentially applicable to this action, because consolidation within the same area of contamination does not constitute "placement." Finally, Alternative 2A will take approximately three years to implement, as compared to at least five for Alternatives 3 and 4. A shorter timeframe will lessen impacts to wildlife species and encourage more rapid restoration of the marsh.

EPA has determined that ground water underlying Mound B and the Low-Lying Area does not currently pose a risk to human health, and is not expected to pose such a risk. Ground water in this area is not a source of potable water and is prevented from further migration by discharge to the Raritan River. EPA believes, with a high degree of certainty, that ground water underlying the site will not be used for drinking water in the foreseeable future. However, because contaminants already present in the ground water will continue to discharge to the Raritan River for an extended period of time, both the ground water and the river water will be monitored to ensure that the preferred alternative is protective of human health and the environment.

As part of the OU 2 selected remedy, no further remedial action will be taken to reduce ground-water contaminant concentrations or to control leachate in the refuse layer. The source of Kin-Buc contributions to the contamination in these areas will be eliminated after construction of the OU 1 remedial action, which includes a slurry wall and cap. Natural remediation or attenuation, involving natural process such as degradation, dispersion and dilution, will gradually reduce contaminant concentrations to acceptable levels in the sand and gravel aquifer and in the refuse layer. Contaminants in the bedrock aquifer are already at acceptable levels. Contaminant transport modeling for both the Mound B and Low-Lying areas was conducted as part of the Feasibility Study to determine how long natural remediation would take to achieve this reduction. Results indicate that levels of contaminants drop most rapidly in the Low-Lying Area (MCLs may be attained within 50 years) and less quickly within the Mound B area. However, over time, compliance with federal and state ground-water quality standards will be achieved.

Maintenance of the Mound B cap will continue. As discussed above, a comprehensive ground water monitoring program will be implemented to track changes in ground water quality over time, using existing monitoring wells installed during the OU 2 RI. These wells will be sampled regularly. During each periodic review of the remedy, EPA will determine the need to continue monitoring, based on the collected sampling data. A river water sampling and analysis program will also be implemented in order to monitor the Raritan River water quality adjacent to the site. Although current data does not indicate impacts due to Kin-Buc, this issue will continue to be evaluated over time, as part of the periodic reviews.

EPA and the NJDEPE believe that the preferred alternative is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. The selected alternative achieves the ARARs more quickly, or as quickly, and at less cost than the other options. Therefore, the selected alternative will provide the best balance of trade-offs among alternatives with respect to the evaluating criteria.
This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. However, since the contaminated sediments could not be cost effectively treated due to the small volume of material excavated, the preferred alternative does not satisfy the statutory preference for treatment as a principal element of the remedy with respect to source control. Because this action will result in contamination remaining on site, CERCLA requires that the site be reviewed every five years. This review will be conducted as part of the OU 1 review, since the contaminated sediments will be consolidated within OU 1. If justified by the review, EPA will revise the remedial decision as necessary.

Contingency Remedy

If, during the design process for this operable unit, EPA determines that disposal of the excavated sediment in OU 1 will delay the construction of the OU 1 remedy, EPA may change the preferred alternative to Alternative 2B, which differs from Alternative 2A only in the disposal of the excavated materials at an off-site chemical waste facility. The following description of how the selected remedy meets the CERCLA 121 statutory determinations also applies to the contingency remedy, except where noted.

STATUTORY DETERMINATIONS

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that are protective of human health and the environment. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under federal and state environmental laws unless a statutory waiver is justified. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource-recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes, as available. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected alternative provides for protection of human health and the environment by removing the source of PCB contamination, thereby reducing the volume of contaminated sediments in the wetlands from which PCBs and other contaminants migrate via bioaccumulation into resident biota such as fish and fiddler crabs. The excavated sediment will be consolidated within the Operable Unit 1 containment system, which will prevent future releases into the surrounding environment. Because this remedy involves removal of a limited portion of the marsh, approximately 1.36 acres, short-term and long-term impacts to the wetland are expected to be minimal. In addition, a shorter timeframe for implementation of the remedy will lessen impacts to wetlands biota and encourage more rapid restoration of the wetlands ecosystem. No permanent alteration of the wetlands will result from implementation of the remedy. Active restoration of excavated areas will reduce any long-term impacts.

Compliance with ARARs

The selected remedy is expected to comply with all ARARs, as described in Table 3. There are no chemical-specific ARARs for the sediment medium. However, the remedy is designed to comply with all action-and location-specific ARARs that pertain to activities in wetlands, coastal areas, and floodplains, including design and implementation of a wetlands mitigation program and restoration of excavated areas of the marsh. The remedial activity will complywith the National Ambient Air Quality Standard. Any dewatering liquid derived from sediment consolidation will be disposed of in accordance with TSCA requirements. Potential RCRA Land Disposal Restrictions do not apply to consolidation of contaminated materials within the area of contamination. Should EPA find it necessary to change the selected remedy from Alternative 2A to Alternative 2B, the excavated sediments will be tested to determine whether they constitute RCRA characteristic hazardous wastes prior to removal from the site. If the sediments are RCRA characteristic, RCRA Land Disposal Restrictions will apply, and treatment such as solidification or stabilization will be utilized prior to disposal.

Cost-Effectiveness

The selected remedy has been determined to provide the greatest overall long-term and short-term effectiveness in proportion to its present worth cost, $3,637,000, when compared to equivalently protective alternatives, such as Alternatives 2B and 2C. Alternatives 3 and 4 were determined to be less effective and more costly.

Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the second operable unit action at the site. EPA has determined that the selected remedy provides the best balance of trade-offs in terms of the five primary balancing criteria, including state and community acceptance, although the selected remedy does not involve reduction of toxicity, mobility, or volume through treatment. The selected remedy provides the greatest long and short-term effectiveness, is easily implementable, and provides the greatest cost-effectivness compared to Alternatives 2B and 2C. Preference for Treatment as a Principal Element

The selected remedy does not satisfy the preference for treatment as a principal element, since treatment of the contaminated sediment did not provide greater effectiveness, or risk reduction and resulted in disproportionately higher costs because of the small volume and relatively low levels of contaminants of concern observed in the sediments.

DOCUMENTATION OF SIGNIFICANT CHANGES

The costs described in the Proposed Plan did not include the comprehensive ground-water and surface-water monitoring program as described in the Selected Remedy section. Present worth costs of this program are estimated at $677,900, based on a 30-year time period. Annual O&M costs are estimated at $44,100. These costs have been added to the costs reported in the Proposed Plan, resulting in the higher present worth and O&M costs which appear in the Description of Alternatives and Comparative Analysis sections.

APPENDIX I

FIGURES

Figures

APPENDIX II

TABLES

The following ARARs have also been identified for remedial activity at the Kin-Buc site:

1 The Coastal Zone Management Act 16 USC 1451 Section 307 (c) (1).

2 The National Ambient Air Quality Standard for PM 10 of 150 g/m3 (24 hour average)